Dhárwár Farm Stock, 1882-83.

Sub-Division.	Carts.		Ploughs.		Oxen.	Cows.	Buffaloes.		Horses.	Sheep and Goats.	Asses.
	Riding.	Carrying	Two Bullock.	Four Bullock.			He.	She.			
Dhárwár ...	177	4614	8547	1126	23,982	15,482	5526	11,126	904	16,237	509
Hubli ...	162	4396	5144	336	17,562	8066	2268	7424	484	13,988	1313
Navalgund ...	47	3948	2263	419	20,446	6962	1729	7392	500	26,005	1047
Gadag ...	91	4470	7206	1449	28,533	12,289	2335	9630	519	48,616	797
Bankápur ...	11	4020	8222	712	23,272	15,218	4747	8597	564	12,996	854
Ránebennur ...	15	3111	7043	2181	23,646	12,409	2010	9459	419	31,619	1305
Hángal ...	8	3075	8791	158	23,152	18,954	5840	6819	403	9936	150
Karajgi ...	21	3718	7320	1726	24,194	14,216	2761	9791	551	29,145	389
Kalghatgi ...	59	2444	7822	2	22,781	17,747	6230	5514	463	4725	281
Kod ...	11	3895	12,696	1791	34,801	23,224	5139	11608	382	18,007	239
Ron ...	5	2574	3734	635	16,141	6312	1438	6082	289	20,851	435
Total ...	607	40,265	78,788	10,535	258,510	151,379	40,523	83,452	5478	231,125	6319

A Plough.

One pair of oxen can till six to eight acres of rice land, ten to fifteen acres of ordinary dry-crop land, and thirty to forty acres of black soil. Thirty-two acres of black soil and eight acres of common soil or fifteen acres of common soil and five acres of garden land would enable a husbandmen to live like an ordinary retail dealer. In good years a man with a holding of this size might save; but as a good year does not come oftener than once in five years, the owner of so small a holding would find it difficult to save much.

Irrigation.

The Poona-Harihar road, which runs north-west and south-east, divides the district into two belts, the hilly and woody west rich in water both for drinking and for tillage, and the open waterless east. Parts of Navalgund and Ron, in the eastern plain, which are crossed by the Bennihalla, are particularly badly off for water. The small streams dry early in the hot season, and what water is found by digging in their beds is too brackish for drinking. The well water is also apt to grow brackish. So short is the supply that from March to May the people of each caste form themselves into a water club, and every two or three days fetch water in bullock or buffalo carts from a distance of two or three miles. The dryness of these parts is not of recent date. Under the Peshwás (1756-1817), officers who fell into disgrace were often sent to govern this waterless or *nirjal* land. Irrigation is chiefly from ponds and reservoirs, in some cases with the help of canals. The pond system of irrigation is common in Madras and Maisur, but is rare in the Bombay Presidency. Three conditions favour the multiplying of ponds and reservoirs in west and south-west Dhárwár: the abundance of suitable sites, the certain and long continued local rainfall, and the absence of under-ground water. The stream beds and valleys among the low ranges of metamorphic schist supply numerous. sites suitable for storage lakes. In the western sub-divisions of Hángal, Kod, Kalghatgi, and Bankápur seldom more than four and often not more than two months in the year pass without rain. The absence of under-ground springs seems to be due to the uprightness or highly inclined position of the clay slate and associated rocks which if flatter might have formed water-bearing strata. Except below ponds wells are rare.

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IRRIGATION.

Reservoirs.

Most of the ponds and reservoirs are old works. It is not known when and by whom they were made. But most are believed to date from the Vijayanagar or Anegundi kings (1335-1570) who were famous for their success in water works. Almost all traditions of local prosperity centre in the first half of the sixteenth century, the reign of the great Krishna Ráya (1508-1542) who was famous for the number and magnitude of his public works.[1] During his reign the great lake near Shiggaon five miles north of Bankápur and other fine reservoirs are said to have been built. The most remarkable work, which is said to have been planned and carried out by a minister named Damak Mudh, was the damming in no less than seven places of the half mile broad Tungbhadra. Across this great river dams or *bandárás* formed of gigantic blocks of stone, often many tons in weight, were thrown. From five of these huge works canals, led along both sides of the river, water many miles of garden which are now the richest parts of Belári on the south bank and of the Nizám's country on the north bank of the Tungbhadra.[2] In 1881-82 there were 2979 ponds and reservoirs or one pond for every 1·52 square miles. Of these 1021 were in Kod, 841 in Hángal, 399 in Kalghatgi, 329 in Bankápur, 129 in Dhárwár, 105 in Hubli, ninety-nine in Karajgi, twenty-four in Navalgund, twenty in Gadag, and twelve in Ránebennur. These together water 93,730 acres of land paying a total assessment of £29,625 (Rs. 2,96,250). Of the whole area 87,246 acres were rice lands with a total assessment of £25,054 (Rs. 2,50,540), 5275 acres were garden lands with a total assessment of £4437 (Rs. 44,370), and 1209 acres with a total assessment of £134 (Rs. 1340) assessed at dry crop rates are now watered. The average assessment on each pond is about £10 (Rs. 100) and the area watered from ponds is 7·06 per cent of the whole tillage. The average area watered by each pond is thirty-one acres. Some ponds water the lands of only one or two holders, others water fifty to eight hundred acres often in several villages. These reservoirs as a rule are formed by a low and often irregular dam. They often depend for part of their water on the escape from higher lakes. Often, also, the natural catchment area is increased by catch-water drains or by supply channels from streams. As a rule the waste-water escapes are simple channels cut in the hard soil or gravel. They are generally at the end of a long arm of the pond to avoid breaching the main dam. The outlet sluices, of which the larger reservoirs have generally one or two, are made under and through the dam. These outlets are often masonry works with horizontal holes, stopped with wooden plugs, and surmounted by elaborately carved guide stones for the pole of the plug. Sometimes, especially in the smaller reservoirs, the water is let out by a simple cut through the dam, the opening being roughly filled with earth, stones, and brushwood. The larger lakes are almost always faced in front with walls of dry rubble stone. Below each reservoir

[1] Probably as in other dynasties, Krishna Ráya the greatest of the line has in tradition the credit of the works made by all the members of the family.

[2] Bom. Gov. Sel. CLV. 74.

IRRIGATION.
Reservoirs.

the land is laid out in terraces, and the distribution of water is managed entirely by the people, disputes being settled in ordinary cases by the leading members of the village and in grave cases by the officers of the irrigation department. Most of these reservoirs dry soon after the rains are over, the water being drawn off for rice and other early crops during the breaks in the rains. This practice is necessary to make good the difference between the usual local fall of about thirty inches and the sixty inches which without the help of irrigation rice requires. The watering power of a reservoir depends on its position as well as on its size. In the west where the rainfall is heavy the amount of water which can be drained off a lake and used in watering is much greater than in the dry east.

Some of the ponds though their supply of water does not last throughout the year, are used for watering garden crops. In this case the people have to trust either to the water in wells sunk below the dam, or to the rain-storms of March and April to help the crops through the time when the reservoir is dry. The chief garden crops under these ponds are betel and cocoa-palms, plantains, betel vines, and sometimes sugarcane. The evil of the pond system is that the ponds slowly but gradually have their storage capacity lessened by the deposit of silt. Formerly the landholders, who used the water of the lake, made yearly contributions in money or in labour to remove the silt. This practice has long ceased. Government are now often asked to be at the expense of removing silt deposit, but the clearing of silt is a very costly and unproductive mode of increasing storage. The effect of years of silting can generally be counteracted by slightly raising the whole water surface by adding to the height of the crest of the dam. The only advisable silt clearance is what is required to raise the crest of the dam or to keep the dam in repair. As regards the repairs of these lakes the principle adopted by Government has been to leave the ordinary repairs to the people who profit by the work. When for the proper maintenance of the works large repairs, raising the dam crest, widening the waste weir, or repairing outlets, have become necessary, Government step in and do the work. In such cases a contribution from the villagers used generally to be levied. Since 1880-81 Government have decided to undertake all such repairs at their own cost. Petty repairs to catch-water drains and to water-channels are still left to the people. Repairs and improvements to masonry works are always undertaken by Government. In the case of improvements either a contribution is asked from the villagers or an agreement is taken from them to pay such extra rates or irrigate such extra land as may be required to make the proposed improvements pay. During the ten years ending 1881-82 the total amount spent on repairs was £11,421 (Rs. 1,14,210).

Of the 2979 ponds and reservoirs the chief are at Háveri in Karajgi, at Nagnur in Bankápur, and at Dambal in Gadag.

Háveri.

The Háveri lake, about seven miles south of Karajgi is one of the largest and most important reservoirs in the district. It has a catchment area of sixty-nine square miles in which are many other ponds and reservoirs. It rarely fails to overflow every year, and

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when full its area is 647 acres. The work is provided with two waste weirs of a total length of 350 feet. In 1881-82 the lake watered 515 acres assessed at £509 (Rs. 5090).

Nagnur.

The Nagnur lake in Bankápur has an earthen dam whose water face is protected by a massive dry-stone wall. The dam is 3400 feet long, and has a greatest height of twenty-four feet. The top width is twelve to twenty feet, carrying a cart-road from Shiggaon to the villages on the east. At the north end is a waste channel for the escape of flood waters, and there is a masonry outlet sluice through the dam at each end. The lake is so shallow that on an average the water lasts only for six months after the rains cease, and the lake water has to be supplemented from the wells in the gardens below. These gardens are old established betel and cocoa-palm plantations, and are valuable properties yielding handsome profits to the owners as well as a considerable revenue to Government.

Dambal.

The Dambal lake is fifty-five miles east of Dhárwár in the Gadag sub-division where the rainfall is light and facilities for storing water are few. It is said to be about 300 years old. It was made by an earthen dam 4000 feet long and about twenty-five feet in greatest height whose water face is guarded by a massive dry-stone retaining wall. It has a masonry waste weir at each end, 335 feet long and two masonry outlets for the discharge of water for irrigation. The lake was originally a very fine work, but, at the beginning of the present century, it had greatly silted, and so much of the bed was overgrown with a thick *bábhul* forest that for some time its water had been comparatively useless. A recent survey has fixed the area of water surface at 300 acres and the capacity at $14\frac{3}{4}$ millions of cubic feet. The catchment area measured forty-six square miles, and, with an average rainfall of twenty inches, the supply of water would be greatly in excess of the storage. The lake usually ran dry in December and wells had to be dug and worked for four or five months every year at great cost. The periodical failure of the lake's supply resulted in much of the land lying fallow for half the year, after the six months' crops were reaped, and a great deal was sown with ordinary dry crops. The lake was repaired by Government in 1824 and 1849, and in 1860 minor repairs were carried out. It was further repaired during the famine of 1876-77 and 1877-78. The 1876 and 1877 improvements included the raising of the water surface six feet, thereby increasing the lake's storage capacity from $14\frac{3}{4}$ to 108 millions of cubic feet; the making of a new waste weir 300 feet long with its crest twelve feet below the new top of the dam on which extreme floods are calculated to rise 8·6 feet; the extension and improvement of the outlets; the construction of a distribution channel $1\frac{1}{2}$ miles long commanding 1790 acres; and the clearing of the *bábhul* forest in the lake bed. These great improvements were completed by the end of 1878.

Madag.

Besides these lakes a fourth called Madag lies in Maisur limits about two miles south of the Kod town of Másur. The boundary between Kod and Maisur runs along the top of the old dam so that the lake is in Maisur, while the lands which it waters are in Kod. Like other irrigation works in the south and west of the district, the Madag

lake is believed to date from the time of the Vijayanagar kings (1335-1570). The maker of the lake intended to close the gap in the hills through which the Kumudvati feeder of the Tungbhadra flows into Kod, and by this means to form a lake on the south side of the range of hills which divide the Másur valley from Maisur. This was accomplished by throwing up an earthen embankment, now about 800 feet thick at the base and 100 feet high, faced towards the lake with huge stone blocks descending in regular steps from the crest of the embankment to the water's edge. Two similar embankments were also thrown across other gaps in the hills to the right and left of the Kumudvati valley to prevent the pent-up waters escaping by them, and a channel was cut along the hills for the overflow of the lake when it had risen to the intended height. When full this lake must have been ten to fifteen miles long and must have supplied water for the irrigation of a very large area.[1] The neighbouring hills still bear traces of vast cuttings for material and of the roads by which it was brought to the site. A moderate sized fort on the hill commanding the lake is said to have been built for the protection of the work people. Each of the three embankments was provided with sluices built of huge slabs of hewn stones for the irrigation of the plain below, and two of these remain as perfect as when they were built. These sluices were built on the same principle as other old Hindu local sluices, a rectangular masonry channel through the dam closed with a perforated stone fitted with a wooden stopper. But, as the sluices had to be in proportion to the size of the lake, instead of the small stone pillars which in ordinary works carried the platform over the stopper, the supports were formed of single stones weighing about twenty tons each. To the upper sluice a tradition of human sacrifice attaches. As it was the crowning point of this great work the Vijayanagar king and his court met to see the great single stone pillars raised to their places. For days the workmen's efforts were vain. At last it was known that the Place Spirit was angry, and, unless a maiden was offered to her, would not allow the pillar to be raised. Lakshmi the daughter of the chief Vadar or pond-digger offered herself, and was buried alive under the site of the pillar. The spirit was pleased, and the pillar was raised and set in its place without mishap. In honour of Lakshmi the sluice became a temple.[2]

[1] Bom. Gov. Sel. CLX. 87.

[2] Lieut.-Colonel Playfair, R. E., Superintending Engineer for Irrigation, 27th October 1879. According to a second legend the *pátil* of Másur, whose family lived at Pura Parkeri in the Maisur division of Shimoga had a beautiful daughter Kenchava whom the Vijayanagar king wished to marry. As her father was of a higher caste than the king the girl refused the king's offer and fled. Afterwards her parents wished to marry Kenchava to the *pátil* of Isur in the Shikárpur sub-division of Maisur. They set out to celebrate the marriage, but on passing a temple now covered by the waters of the Madag lake, Kenchava entered the temple and devoted herself to the god. When the lake was made, Kenchava refused to leave her god, and, when the first floods of the rainy season came, the temple was hidden under the lake and the girl was drowned. It was a season of severe floods and a watchman was set to watch the dam. Kenchava entered into this watchman and told him to go and tell the *pátil* that unless he offered her a woman nine months with child she would burst the lake.

The lake was finished and filled. But in some heavy flood it burst not through the carefully closed valley but by the most westerly of the three embankments. Through this outlet a vast body of water forced its way in a deep groove with a fall of nearly 100 feet, wearing a chasm with nearly perpendicular sides as if cut with a knife. As the pressure of the water grew lighter and the strata to be cut became harder, the wearing ceased, and a certain quantity of water remained in the bed of the lake. The surplus now passes in a pretty little waterfall over the point where the cutting ceased. After this disaster no steps were taken to make use of the water which the broken lake still held. The builders abandoned the undertaking, and, till recent times, the unfinished channels and the dam remained overgrown with forest. It was sometimes visited to see the single stone of the main sluice which remained one of the wonders of the country. After the country passed to the English two difficulties prevented any use being made of the water stored in the broken lake. When the breach occurred, the lowest of the old native sluices, which offered the only channel for drawing water through the enormously thick dam, was left too high above the surface of the water to be of any value. Any attempt to dam the outlet chasm, and so raise the level of the lake sufficiently to use the old sluices, was prevented not only by its great expense, but by the opposition of the Maisur villagers, whose lands lay on the margin of the lake, and would be swamped by any rise in its level. Owing to these difficulties nothing was done until, in 1858-59, Lieutenant-Colonel Playfair, R. E., then executive engineer, thought that if a culvert could be laid below the old sluice the lake could be successfully tapped. This was done under Colonel Playfair's immediate supervision. For this the old native sluice had first to be cleared as it was filled with dirt. Clearing was begun on both sides, not without the opposition of the Maisur people who at first drove the workmen off, and objected to anything being done on their side. When the two parties of workmen came within 100 feet of each other progress was stopped as the stones that supported the roof were found to have fallen in. The sluice appears to have been originally laid on the rocky surface of the valley, roofed with enormous stones, and the dam

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The watchman said he could not leave his post. Kenchava promised that if he went she would not break the big dam but that if he was long in coming back she would burst through one of the hills. The watchman went and gave the headman Kenchava's message. But the headman paid no heed to his message, punished him for leaving his post, and offered Kenchava no sacrifice. Enraged with his insolence Kenchava broke through the hill and the embankment as well. Poor people used to go to the lake and beg Kenchava to lend them nose and earrings to use at a wedding and found what they wanted at the water side. One man forgot to return the ornaments and Kenchava no longer provides them. In 1870, a fisherman's tackle got entangled in the roof of the under-water temple. Diving down to free his tackle the fisherman entered the temple and saw a golden image of Kenchava. She warned him to tell no one she was alive, and told him that on the day he let out her secret he would burst a blood-vessel and die. He asked her how he could get out of the temple; she gave him a push and he was on the surface. He kept his secret for two years, told it, burst a blood vessel, and died. In seasons of drought, the heads of the temples in Shikárpur come to this lake with a round piece of gold and a nose-ring. They lay food on a small raft and pushing it into the lake pray Kenchava to send rain. Dr. Burgess' List of Archæological Remains, 17-18.

built over it. The weight of the one hundred feet of earth had been too great for the sluice-roof. In the part where the sluice-roof had fallen the further clearing became a matter of great danger. The only plan appeared to be to gently dig over the broken stones and trust to find sounder ones beyond, and thus again to get a roof over the heads of the workmen. This attempt was successful. Only a few of the covering stones had fallen in; and the earth above them was sufficiently consolidated by time to allow of a passage being dug through it. The two parties at length joined, and the old subterranean gallery was opened through its whole length of 800 feet. The digging of the culvert below the floor of the old sluice was then begun, the old work acting as a ventilator as well as a roof till the new tunnel was arched. All went well till towards the centre where a mass of extremely hard rock gave much trouble.

As a part of Colonel Playfair's scheme two canals were to be dug, leading off 33½ feet above the original bed of the river. Six miles of the whole length of the 16½ miles of the left bank canal, and eight miles of the whole length of the 15½ miles of the right bank canal have been dug. The left bank canal is carried along the rear slope of the main embankment until it reaches the new river channel which it crosses by a large aqueduct. In 1882-83 four miles of the right bank canal were planted with about 7200 trees mostly *bábhuls*, mangoes, and *nims*. The total area watered was 482 acres and the crops watered were mostly sugarcane, rice, garlic, and onions. The water rates vary from 16*s*. (Rs. 8) an acre for twelve months' crops to 2*s*. (Re. 1) an acre for rainy-season crops. The lake might easily be made to hold a great deal more water. Even by boarding the waste weir the storage might be greatly increased. What prevents the carrying out of fresh works is that every foot which the surface of the lake is raised swamps a large area of rich land. In 1872 an attempt was made to induce the Maisur villagers to accept compensation and let the land be flooded; but the attempt failed. The matter is still under consideration, and it is hoped that some arrangement may shortly be made. At present as the canals are small, with only a slight fall, it is not possible to draw off the lower portion of the water above the sluice sill level, and the upper portion is lost by evaporation. As the total depth of the lake above the sill of the canal sluices is only 4·50 feet little water is available for late and hot weather crops. The ordinary rainfall is enough for the common early crops which are grown to a great extent in the neighbourhood.

Canals.

The only important system of canal irrigation is on the south bank of the Dharma, the Varda's chief feeder, which rises in the Sahyádri hills about twenty miles south-west of Hángal. The work is about three hundred years old, but most of the masonry is stones taken from Jain or Chálukyan temples. The head works of the main canal are at the village of Shringeri about five miles south-west of Hángal. A solid masonry weir thrown across the stream raises the water a few feet, and two canals are led off one on each bank. The left bank canal which is called the Kamanhalli canal is about three miles long. It feeds four reservoirs and waters a small area of land on its way. The right bank canal, which is known as

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the main Dharma canal, is seventeen miles long, passing through the villages of Sevhalli, Gejihalli, and Gavrápur. Near its head it sometimes carries over 400 cubic feet the second. At Gavrápur it crosses a road under a masonry bridge and continues through the land of Sirmápur and fills the two large reservoirs of Dholeshvar and Surleshvar. At Surleshvar, seven miles from Shringeri, the canal divides into two branches, one flowing east to A'dur and the other flowing south to A'lur. Each of these two main branches throws out a number of smaller channels which command a considerable tract of country between the Dharma and the Varda. The Dharma is also dammed by a masonry weir at a point about thirteen miles below Shringeri and a canal known as the Naregal canal is taken off at the right bank. This supplies three ponds at Naregal besides watering the land under its immediate command. The Dharma has a catchment area of sixty square miles at the site of the main canal headworks which is densely covered with forest. This forest land adds greatly to the value of the Dharma as it gives off the rainfall in manageable quantities and over lengthened periods. The Naregal canal intercepts the drainage from a great deal of the land watered by the main Dharma canal as well as the supply afforded by the catchment area of the river between the two head works. The Dharma flows only during the six wet months. To make use of its water during the dry months, a number of ponds were built by the original projectors of the scheme. These ponds are below the canals, and are filled by the surplus water of the river during the rains. Storage is thus obtained during the hot months and irrigation is perennial. In 1881-82 these canals supplied ninety-two ponds of which thirty-nine were fed from the main canal, fifty from the branch canals, and three from the Naregal canal. The largest of these ponds are at Dholeshvar, Surleshvar, Arleshvar, A'dur, Havanji, Balambid, A'lur, and Naregal. In 1881-82 the area watered by the canal and the ponds dependent on the canal was 8660 acres. Of these 8660 acres 208 were watered by the Kamanhalli or left bank canal, 7399 by the main and branch Dharma canals, and 1053 by the Naregal canal. Of the 8660 acres 8127 were rice land and 533 were garden land. The gardens under the Naregal reservoir are very rich, yielding the finest betelnuts in the neighbourhood. The revenue realized was £3542 (Rs. 35,420). The principles of the original project are sound, but mistakes of detail interfere with the success of the scheme. The fall of the canal bed is unduly slight and is irregular. Nowhere is the fall more than one foot in a mile and in many parts it is much less than a foot. The course of the canal is very roughly laid out. Sharp turns and corners are common, and there are long needless bends, unless indeed owners refused to let the canal pass through their lands. From Shringeri to Surleshvar not a work was made to carry the local drainage across the canal. In consequence silt deposits are unusually heavy, and nearly the whole of the water which reaches Surleshvar is carried through the A'lur branch which has a rapid fall. Only in heavy floods, perhaps for a few days twice a year, does the water find its way down the A'dur branch. Formerly all

villagers interested in the canal busied themselves once a year in a general and thorough silt clearing. This custom has gradually fallen into disuse. Where the system is so large and complex the principle of leaving the distribution of the water entirely to the people is open to grave objection. The villages on the higher reaches of the canal take an undue share of the water to the serious injury of those lower down. For some time inquiries have been made how far the whole work can be placed on a sounder footing, and a regular and just system of water distribution be introduced. The attention of the irrigation department has for some time been given to the improvement of the Dharma canal. A survey has been made of the main canal, and it is proposed to carry out works for its improvement and to bring it under proper control. The chief works would be regulating the fall by clearing obstructions, straightening the course in places, providing masonry escapes, and making the width more uniform. It is proposed to fix a regulator at the head-works, to provide proper outlets, and to introduce more system into the management of the canal.

Besides the Dharma canals there are two minor works of the same character; one for using the water of a stream running from the Nidsingi reservoir south to the Dharma at Kuntanhoshalli, and the other for using the water flowing through the valley south of Konankeri, and, by means of a channel made to connect numerous ponds, eventually to carry on the surplus water to the large Belgal reservoir. As regards the first or Nidsingi work, the stream passing near Bassápur was diverted to the Kurgudri reservoir by an embankment and deep cutting south of Bassápur. The original stream passes south and joins the Dharma at Kuntanhoshalli. Between the villages of Kurgudri and Satinhalli an ancient masonry weir across this stream feeds a small channel on the right bank, which waters the lands of Kuntanhoshalli. A mile below this weir stood an old dam from which the Sávasgi lands were watered. This old dam was breached and ruined about forty years ago and the Sávasgi lands lost this supply of water. To provide a remedy it was found more economical to rearrange the Kuntanhoshalli weir work so as to take off an irrigation channel from that weir on the left bank to the Sávasgi lands, than to reconstruct the Sávasgi weir itself. The work is now completed. The supply of water to the Kuntanhoshalli lands has also been improved by the new works. The Belgal Kálva as the channel is called which carries off the surplus water which gathered in a large valley south of Konankeri, connects a number of ponds from which, as each pond gets filled, the surplus water flows into the next, until it ends in the Belgal reservoir. This channel, which is about nine miles long, passes through the lands of Hankanhalli, Bamanhalli, Nellibid, Yelvatti, Talkerikop, and Gundur, and finishes at the Belgal reservoir. In many places are masonry outlets, whence rice lands lying between and not under the lakes are also watered. These outlets are said to have been an after-thought. The villagers of Belgal, who are the last to benefit by this channel, complain that in consequence of these outlets the water is taken for so many fields that the reservoirs do not fill as they used to, and the Belgal

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reservoir has lost a large supply of water. This channel was repaired and the new outlets made some years ago at the expense of the villagers.

WELLS.

According to the Collector's return for 1882-83 of 12,002 wells 3099 were step wells and 8903 were stepless wells. The average depth of a well varies from fifteen feet in Kod to a hundred and twenty feet in Navalgund. The cost of building a step well varies from £30 to £200 (Rs. 300-2000) and of building a stepless well from £7 10*s.* to £30 (Rs. 75-300). The following table shows the number of wells, their average depth, and the cost of building them:

Dhárwár. Wells, 1882-83.

SUB-DIVISION.	WELLS.				COST.			
	With Steps.		Without Steps.		With Steps.		Without Steps.	
	Number.	Average depth.	Number.	Average depth.	Lowest.	Highest.	Lowest.	Highest.
		Feet.		Feet.	£	£	£	£
Dhárwár	210	25	1361	70	50	150	10	20
Hubli	143	63	1194	80	50	200	15	25
Navalgund ...	24	120	311	120	80	200	20	30
Gadag	489	40	824	40	50	100	10	20
Bankápur	457	25	663	50	50	100	10	20
Ránebennur ...	503	40	440	50	50	100	10	20
Hángal	80	30	1339	30	40	80	10	20
Karajgi	396	36	573	42	50	100	10	20
Kalghatgi	74	44	285	69	50	100	10	20
Kod	660	15	1679	15	30	70	7½	15
Ron	63	41	234	50	50	100	10	20

Navalgund and Ron which are badly placed for pond storage are also ill-suited for wells. The people are put to much inconvenience, not only because drinking water is scarce, but because it is bad, being charged with salt and lime. The supply of water in wells depends on reservoirs lying on a higher level from which the water soaks into the wells below. The wells in garden lands are nothing more than ponds of all sizes and shapes, and as they are not regularly built or surrounded with a parapet wall, the rains sweep much mud and filth into them, and unless they are regularly cleared they become choked and useless in a few years. These wells begin to be used about March, when, either from a scanty rainfall or from other causes, the pond supply begins to fail. When the water in the wells is on a level with or near the surface, two men scoop up the water by swinging a basket or *guda* through it. When the water is five or six feet below the surface the leather bag or *mot* is worked. As many of these wells are shallow and have no spring they dry as soon as the ponds.

MANURE.

The use of manure is generally understood. Except alluvial lands, all fields are more or less manured according to their wants. The garden lands are fully manured especially those growing the richer crops, which are manured with great care and with as much liberality as the husbandman can afford. Rice lands are freely manured and even the dry crops get a fair share. Waste lands, when brought under tillage, are not manured for the first year or two. In such cases the first crop sown is almost always Indian millet followed by